

**UNITED STATES PATENT APPLICATION**  
**for**

**SUBSTITUTED HYDROCARBYL FUNCTIONAL SILOXANES**

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**FOR**

**HOUSEHOLD, HEALTH, AND PERSONAL CARE APPLICATIONS**

**Having as Inventors;**

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**Cassandre Michelle Fecht**

**Deborah Lynn Meyers**

**Heidi Marie Van Dort**

**Isabelle Van Reeth**

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**CROSS REFERENCE**

**[0001]** This application is a Continuation in Part of Application No. 10/157,639, filed May 28, 2002.

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**FIELD OF THE INVENTION**

**[0002]** The present invention relates to cosmetic, household and healthcare compositions containing a hydrocarbyl functional organopolysiloxane. The hydrocarbyl functional organopolysiloxane contains at least one siloxy unit of the formula  $-R^2OCH_2CH_2OH$ , where  $R^2$  is a divalent hydrocarbon group containing 2 to 6 carbon atoms. The inclusion of the hydrocarbyl functional organopolysiloxane results in personal, medical and household care compositions with improved performance and/or stability.

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## BACKGROUND OF THE INVENTION

[0003] In the household, health and personal care areas, the need exists for silicone raw materials that contain both hydrophilic and hydrophobic functionality. To date, this need has been addressed with polyoxyalkylene and silanol functional silicone materials. In particular, there are numerous examples of the use of polyoxyalkylene functional silicones, also referred in the art as silicone polyethers and/or silicone glycols, in various personal, household, and healthcare applications.

[0004] Majority of the oxyalkylene functional silicones used in various personal, household, and healthcare applications contain polyoxyalkylene moieties, that is having multiple oxyalkylene units. This is most likely because of two reasons. First, majority of these oxyalkylene functional silicones have been used as surfactants in such applications. As analogous to hydrocarbon based polyoxyalkylene surfactants, multiple oxyalkylene units are needed to impart sufficient hydrophilicity for surfactant character. The amount of oxyalkylene units present in such surfactant molecules is often depicted as a HLB (hydro-lipophilic balance) value. Thus, polyoxyalkylene functional silicones with varying HLB's have found use in various personal, household, and healthcare applications where they function as surfactants and emulsifiers.

[0005] Secondly, the majority of the oxyalkylene functional silicones used in various personal, household, and healthcare applications contain polyoxyalkylene moieties because of the ready availability of the starting materials and synthetic ease of making allyloxypolyethers with that minimum substitution. Polyoxyalkylene functional silicones are usually prepared by hydrosilylation of an organohydrogensiloxane (SiH) and an olefinically substituted polyoxyalkylene. For example, the platinum catalyzed reaction of Si-H polymers with allyl ethers was disclosed in US Patent 2,823,218 (February 11, 1958). Typically, the smallest oxyalkylene substituents used in such applications are EO<sub>4</sub> and PO<sub>2</sub>. This is because of the ready availability of the starting materials and synthetic ease of making allyloxypolyethers with that minimum substitution.

[0006] US Patents 5,486,566 and 6,060,044 provide representative examples of the use of polyoxyalkylene functional silicones in various personal care formulations. The '566 patent describes siloxane gels for use in various personal care applications. The gel contains an amide-free gelator, a siloxane polyether for strengthening the gel, and a volatile methyl

siloxane. While the '566 teaches the use of both oxyethylene units -  $(C_2H_4O)_p$  - and oxypropylene units -  $(C_3H_6O)_s$  - for the polyether segments of the siloxane polyether, the oxypropylene based polyethers are preferred. US Patent 6,060,044 describes a cosmetic composition comprising in a cosmetically acceptable medium, at least one guar gum and at 5 least one oxyalkylenated silicone in a guar gum/silicone weight ratio of less than or equal to 5:1.

[0007] Many of the existing polyoxyalkylene and silanol functional silicones possess inherent properties that limit their use in many household, health and personal care formulations. For example, existing polyoxyalkylene and silanol functional silicones have 10 unpleasant aesthetics upon skin application from a formulation. Furthermore, many have limited stability in acid or basic formulations. Thus, there is a need for silicones having both polar and non-polar characteristics yet provide good aesthetics upon skin application and that are also stable in acidic and basic formulations.

[0008] The present inventors have discovered that the inclusion of a hydrocarbyl functional 15 organopolysiloxane, in particular where the hydrocarbyl group has the formula -  $R^2OCH_2CH_2OH$ , where  $R^2$  is a divalent hydrocarbon group containing 2 to 6 carbon atoms, results in personal care, medical and household care compositions with unique properties. In particular, the hydrocarbyl functional organopolysiloxanes are stable in acidic and basic formulations, and provide good aesthetics upon skin application.

## SUMMARY OF THE INVENTION

[0009] The present invention provides a composition comprising;

5 (i) a hydrocarbyl functional organopolysiloxane comprising a siloxy unit of the formula  $R^1 R_a SiO_{(3-a)/2}$  wherein  
R is a monovalent hydrocarbon group,  
 $R^1$  is a hydrocarbyl group having the formula  $-R^2 OCH_2 CH_2 OH$ ,  
 $R^2$  is a divalent hydrocarbon group containing 2 to 6 carbon atoms,  
10 a is zero to 2; and  
(ii) at least one cosmetic ingredient, household care ingredient, or health care ingredient.

[0010] This invention also relates to cosmetic, household, or health care formulations comprising the hydrocarbyl functional organopolysiloxane of the present invention. These

15 formulations comprise a cosmetic ingredient, a household care ingredient, or a health care ingredient, and an optional cosmetic active, a household care active, or a health care active such as an antiacne agent, anticaries agent, antidandruff agent, antifungal agent, antimicrobial agent, antioxidant, antiperspirant agent, cosmetic biocide, deodorant agent, external analgesic, oral care agent, oral care drug, oxidizing agent, reducing agent, skin bleaching  
20 agent, skin protectant, sunscreen agent, UV light absorbing agent, pigments, moisturizers, vitamins, enzymes, optical brighteners, fabric softening agents, or surfactants .

## DETAILED DESCRIPTION OF THE INVENTION

[0011] The hydrocarbyl functional organopolysiloxane of the present invention comprises a siloxy unit of the formula  $R^1 R_a SiO_{(3-a)/2}$  wherein R is any monovalent hydrocarbon group, but typically is an alkyl, cycloalkyl, alkenyl, aralkyl, or an aryl group containing 1-20 carbon atoms,  $R^1$  is a hydrocarbyl group having the formula  $-R^2 OCH_2 CH_2 OH$ ,  $R^2$  is a divalent hydrocarbon group containing 2 to 6 carbon atoms, a is zero to 2.

[0012] Organopolysiloxanes are well known in the art and are often designated as comprising any number of M units ( $R_3 SiO_{0.5}$ ), D units ( $R_2 SiO$ ), T units ( $RSiO_{1.5}$ ), or Q units ( $SiO_2$ ) where R is independently any monovalent hydrocarbon group. In the present invention, the organopolysiloxane has at least one hydrocarbyl substituent of the formula  $-R^2 OCH_2 CH_2 OH$ , designated as  $R^1$ . The  $R^2$  group in the hydrocarbyl substituent is a divalent hydrocarbon group containing 2 to 6 carbon atoms. The  $R^2$  divalent hydrocarbon is represented by an ethylene, propylene, butylene, pentylene, or hexylene. Typically, the divalent hydrocarbon 15 is a propylene group,  $-CH_2 CH_2 CH_2 -$ .

[0013] The hydrocarbyl substituent is bonded to the organopolysiloxane via a Si-C bond. The hydrocarbyl substituent can be present in the organopolysiloxane via linkage to any organosiloxyl unit, that is it may be present on any M, D, or T siloxy unit. In other words, the hydrocarbyl functional siloxy unit can be a M unit ( $R^1 R_2 SiO_{0.5}$ ), a D unit ( $R^1 R SiO$ ), a T unit ( $R^1 SiO_{1.5}$ ), or a mixture of any of these. The hydrocarbyl functional organopolysiloxane can also contain any number of additional M, D, T, or Q siloxy units of the general formula ( $R_3 SiO_{0.5}$ ), ( $R_2 SiO$ ), ( $RSiO_{1.5}$ ), or ( $SiO_2$ ), providing that the organopolysiloxane has at least 20 one siloxy unit with the  $R^1$  present.

[0014] The weight average molecular weight ( $M_w$ ) or number average molecular weight ( $M_N$ ) of the hydrocarbyl functional organopolysiloxane can vary, and is not limiting. The hydrocarbyl functional organopolysiloxane can be either liquid or solid in form, but are generally liquids.

[0015] The amount of the hydrocarbyl functional groups present in the organopolysiloxanes of the present invention can vary, but typically ranges from 1 to 40 mass percent, alternatively from 5 to 30 mass percent, or alternatively from 10 to 20 mass percent of the 30 total mass of the organopolysiloxane.

[0016] In one embodiment, the hydrocarbyl functional organopolysiloxane has a formula selected from the group:

$R_3SiO(RR^1SiO)_ySiR_3$ ,

$R_3SiO(R_2SiO)_x(RR^1SiO)_ySiR_3$ ,

$R^1R_2SiO(R_2SiO)_xSiR_2R^1$ ,

$R^1R_2SiO(RR^1SiO)_zSiR_2R^1$ ,

5  $R^1R_2SiO(R_2SiO)_x(RR^1SiO)_zSiR_2R^1$ ,

$R^1R_2SiO(R_2SiO)_xSiR_3$ ,

$R^1R_2SiO(RR^1SiO)_zSiR_3$ ,

$R^1R_2SiO(R_2SiO)_x(RR^1SiO)_zSiR_3$ , and cyclic siloxanes of the formula

$-(Me_2SiO)_m(MeR^1SiO)_n-$ .

10 [0017] In these formulas, R is an alkyl, cycloalkyl, alkenyl, aralkyl, or an aryl group containing 1-20 carbon atoms; R<sup>1</sup> is the hydrocarbyl group as defined above, x is 1-500, y is 1-40, z is 1-40, m is 1-6, n is 1-6, and the sum of m + n is 3-12.

[0018] In the alternate embodiment, the hydrocarbyl functional organopolysiloxane is a resin having the formula;

15  $(SiO_2)_c(R^3SiO_{3/2})_d(R^3_2SiO)_e(R^3_3SiO_{1/2})_f\{O_{1/2}SiR^3_2R^4\}_g$

where R<sup>3</sup> is an alkyl group with 1-20 carbon atoms, a cycloalkyl group with 3-20 carbon atoms, an alkenyl group with 2-20 carbon atoms, an aralkyl group, or an aryl group; R<sup>4</sup> is the same as R<sup>1</sup> above, i.e., one of the formulas (i) to (iv); and g is 1-15,000. In such resins, c, d, e, and f represent mole percents, such that c < 100, c + d > 0, and c + d + e + f is 100.

20 Organosiloxane resins of this type typically contain about 0.01-15 weight percent of silanol.

In a preferred embodiment, the hydrocarbyl functional organopolysiloxane has the formula

$R^1Me_2SiO(Me_2SiO)_xSiMe_2R^1$

where R<sup>1</sup> is -(CH<sub>2</sub>)<sub>3</sub>OCH<sub>2</sub>CH<sub>2</sub>OH and x is 1 to 100, alternatively 5 to 50, or alternatively

25 10 to 20.

[0019] The hydrocarbyl functional organopolysiloxanes of the present invention can be made by standard processes such as the hydrosilylation of organohydrogensiloxanes and olefinically substituted polyoxyalkylenes. The hydrosilylation reaction is typically performed in a low molecular weight volatile hydrocarbon solvent such as benzene, toluene, xylene, or

isopropanol to aid in handling the reactants, to moderate an exothermic reaction or to promote the solubility of the reactants. Such processes are described, for example, in the '218 Patent noted above, which is incorporated herein by reference.

[0020] The present invention is based on the unexpected discovery that the inclusion of the 5 hydrocarbyl functional organopolysiloxane, in particular, results in personal care, medical and household care compositions with unique properties. For example, compositions containing the hydrocarbyl functional organopolysiloxane impart the following characteristics when compared to similar formulations without such siloxanes: (a) remain stable at relatively high and low pH; (b) compatibilize both polar and non-polar solvents; (c) 10 offer high lubricity; (d) mitigate skin discomfort or irritation; (e) impart a smooth, soft, moist texture; (f) evenly disperse active agents and pigments; (g) detackify formulation components; (h) moisturize the skin; (i) enhance the durability of formulation components; (j) 15 enhance surface shine; (k) impart the sensory performance of higher molecular weight structures; (l) protect the hair cuticle; (m) aid curl retention; (n) sustain fragrance release; (o) impart softness to solid substrates; (p) increase water absorbency of fabrics; (q) mask surface imperfections; (r) reduce whitening of antiperspirant salts; (s) modify formulation rheology; (t) improve particulate active suspension; (u) improve ease of ironing; (v) enable the 20 suspension and delivery of polar materials in non-polar solvents; and (w) enhance emulsion stability.

20 [0021] As used herein, the terms personal care composition, health care composition, and household care composition are intended to mean typical materials commercially available as products or raw materials in consumer markets containing active and inactive ingredients.

[0022] The hydrocarbyl functional organopolysiloxanes are useful in a number of different 25 products, including hair care products such as hairsprays, shampoos, mousses, styling gels and lotions, cream rinses/conditioners, hair tonics, hair dyes and colorants, permanent waves and bleaches. Also included are skin care products such as cleansers, moisturizers, conditioners, lipsticks, eye makeup, foundations, fingernail polish, suntan products, antiperspirant/deodorant products and depilatories. Also included are household products such as waxes, polishes, heavy and light duty liquid cleaners, fabric softeners, ironing aids, 30 laundry detergents, and window cleaners.

[0023] Some typical ingredients used in these products are surfactants, pigments, solvents, emollients, and carriers. For example, the solvents can include esters (for example, isopropyl myristate and C12-15 alkyl lactate), water, silicone fluids (for example, cyclomethicone,

dimethicone), ethanol, isopropanol, guerbet alcohols having 8-30 carbons, particularly 12-22 carbons (for example, isolauryl alcohol, isocetyl alcohol, isostearyl alcohol), fatty alcohols (for example, stearyl alcohol, myristyl alcohol, oleyl alcohol), and ethoxylated and propoxylated alcohols (for example, the polyethylene glycol ether of lauryl alcohol that

5 conforms to the formula  $\text{CH}_3(\text{CH}_2)_{10}\text{CH}_2(\text{OCH}_2\text{CH}_2)_r\text{OH}$  where  $r$  has an average value of 4 (Laureth-4); PPG-14 butyl ether, where the “PPG-14” portion is the polymer of propylene oxide that conforms generally to the formula  $\text{H}(\text{OCH}_2\text{C}(\text{CH}_3)\text{H})_s\text{OH}$ , where  $s$  has an average value of 14, or PPG-3 myristyl ether which is the polypropylene glycol ether of myristyl alcohol that conforms to the formula  $\text{CH}_3(\text{CH}_2)_{12}\text{CH}_2(\text{OCH}(\text{CH}_3)\text{CH}_2)_t\text{OH}$  where

10  $t$  has an average value of 3, or a hydrocarbon fluid.

[0024] Hydrocarbon fluids are exemplified by organic hydrocarbon fluids such as halogenated hydrocarbon fluids, aliphatic hydrocarbon fluids, aromatic hydrocarbon fluids, and mixtures of aromatic and aliphatic hydrocarbon fluids. The hydrocarbon fluids usually contain about 6 to about 12 carbon atoms. Examples of suitable hydrocarbon fluids include

15 perchloroethylene, benzene, xylene, toluene, mineral oil fractions, kerosenes, naphthas, and petroleum fractions. Particularly preferred are isoparaffinic hydrocarbon fluids exemplified by isoparaffin fluids available from Exxon Mobil Chemical Company, Houston, Tex. U.S.A., sold as Isopar® M Fluid (a C<sub>13</sub>-C<sub>14</sub> Isoparaffin), Isopar® C Fluid (a C<sub>7</sub>-C<sub>8</sub> Isoparaffin),

Isopar® E Fluid (a C<sub>8</sub>-C<sub>9</sub> Isoparaffin), Isopar® G Fluid (a C<sub>10</sub>-C<sub>11</sub> Isoparaffin), Isopar® L

20 Fluid (a C<sub>11</sub>-C<sub>13</sub> Isoparaffin), Isopar® H Fluid (a C<sub>11</sub>-C<sub>12</sub> Isoparaffin), and combinations thereof. Mixtures of solvents can also be used.

[0025] Another ingredient which can be used is an emollient, including compositions such as guerbet alcohols (such as isocetyl alcohol or isostearyl alcohol); esters (such as isopropyl palmitate, isopropyl isostearate, octyl stearate, hexyl laurate and isostearyl lactate); a liquid mixture of hydrocarbons which are liquids at ambient temperatures (such as petroleum

25 distillates and light mineral oils); ethanol; volatile and non-volatile silicone oils, highly branched hydrocarbons, and non-polar carboxylic acids. The emollients can be included in the compositions of the present invention in amounts within the range of 0.01-70%, preferably 0.1-25%, by weight, of the total weight of the composition.

30 [0026] The carrier can include a wide variety of conditioning materials, such as hydrocarbons, silicone fluids, and cationic materials. The carrier can include surfactants,

suspending agents, thickeners etc. Various additional components useful in these compositions are described in US Patent 4,387,090 (June 7, 1983).

[0027] Topical cosmetic, and pharmaceutical compositions according to the invention can contain a carrier, but the carrier should be *cosmetically and/or pharmaceutically acceptable*,

5 i.e., that it is suitable for topical application to the skin, has good aesthetic properties, is compatible with the siloxane copolymers of the present invention, and will not cause any safety or toxicity concerns. It can be formulated to include an emulsion as the carrier such as an oil-in-water emulsion, water-in-oil emulsion, water-in-oil-in-water emulsion, or oil-in-water-in-silicone oil emulsion.

10 [0028] Some other suitable topical carriers include anhydrous liquid solvents such as oils, alcohols, and silicones (e.g., mineral oil, ethanol, isopropanol, dimethicone, cyclomethicone, and the like); aqueous-based single phase solvents (e.g., where the viscosity of the solvent has been increased to form a solid or semi-solid by the addition of appropriate gums, resins, waxes, polymers, salts, and the like). However, the preferred cosmetically and/or

15 pharmaceutically acceptable topical carrier is a hydroalcoholic system or an oil-in-water emulsion. When the carrier is an oil-in-water emulsion, it will include common ingredients generally used for preparing emulsions.

[0029] Some of the typical active ingredients used in products such as these are antiacne agents, anticaries agents, antidandruff agents, antifungal agents, antimicrobial agents, 20 antioxidants, antiperspirant agents and deodorant agents, cosmetic biocides, external analgesics, oral care agents, oral care drugs, oxidizing agents, reducing agents, skin bleaching agents, skin protectants, sunscreen agents, UV light absorbing agents, enzymes, optical brighteners, fabric softening agents, and surfactants

[0030] Some examples of antiacne agents are Salicylic acid and Sulfur. Some examples of 25 anticaries agents are Sodium Fluoride, Sodium Monofluorophosphate, and Stannous Fluoride. Some examples of antidandruff agents are Coal tar, Salicylic acid, Selenium Sulfide, Sulfur, and Zinc Pyrithione. Some examples of antifungal agents are Calcium Undecylenate, Undecylenic Acid, Zinc Undecylenate, and Povidone-Iodine. Some examples of antimicrobial agents are Alcohol, Benzalkonium Chloride, Benzethonium Chloride, 30 Hydrogen Peroxide, Methylbenzethonium Chloride, Phenol, Poloxamer 188, and Povidone-Iodine.

[0031] Some examples of antioxidants are Acetyl Cysteine, Arbutin, Ascorbic Acid, Ascorbic Acid Polypeptide, Ascorbyl Dipalmitate, Ascorbyl Methylsilanol Pectinate, Ascorbyl Palmitate, Ascorbyl Stearate, BHA, p-Hydroxyanisole, BHT, t-Butyl

Hydroquinone, Caffeic Acid, Camellia Sinensis Oil, Chitosan Ascorbate, Chitosan Glycolate, Chitosan Salicylate, Chlorogenic Acids, Cysteine, Cysteine HCl, Decyl Mercaptomethylimidazole, Erythorbic Acid, Diamylhydroquinone, Di-t-Butylhydroquinone, Dicetyl Thiodipropionate, Dicyclopentadiene/t-Butylcresol Copolymer, Digalloyl Trioleate, 5 Dilauryl Thiodipropionate, Dimyristyl Thiodipropionate, Dioleyl Tocopheryl Methylsilanol, Isoquercitrin, Diosmine, Disodium Ascorbyl Sulfate, Disodium Rutinyl Disulfate, Distearyl Thiodipropionate, Ditridecyl Thiodipropionate, Dodecyl Gallate, Ethyl Ferulate, Ferulic Acid, Hydroquinone, Hydroxylamine HCl, Hydroxylamine Sulfate, Isooctyl Thioglycolate, Kojic Acid, Madecassicoside, Magnesium Ascorbate, Magnesium Ascorbyl Phosphate, 10 Melatonin, Methoxy-PEG-7 Rutinyl Succinate, Methylene Di-t-Butylcresol, Methylsilanol Ascorbate, Nordihydroguaiaretic Acid, Octyl Gallate, Phenylthioglycolic Acid, Phloroglucinol, Potassium Ascorbyl Tocopheryl Phosphate, Thiodiglycolamide, Potassium Sulfite, Propyl Gallate, Rosmarinic Acid, Rutin, Sodium Ascorbate, Sodium Ascorbyl/Cholesteryl Phosphate, Sodium Bisulfite, Sodium Erythorbate, Sodium 15 Metabisulfide, Sodium Sulfite, Sodium Thioglycolate, Sorbityl Furfural, Tea Tree (Melaleuca Aftemifolia) Oil, Tocopheryl Acetate, Tetrahexyldecyl Ascorbate, Tetrahydrodiferuloylmethane, Tocopheryl Linoleate/Oleate, Thiodiglycol, Tocopheryl Succinate, Thiodiglycolic Acid, Thioglycolic Acid, Thiolactic Acid, Thiosalicylic Acid, Thiotaurine, Retinol, Tocophereth-5, Tocophereth-10, Tocophereth-12, Tocophereth-18, 20 Tocophereth-50, Tocopherol, Tocophersolan, Tocopheryl Linoleate, Tocopheryl Nicotinate, Tocoquinone, o-Tolyl Biguanide, Tris(Nonylphenyl) Phosphite, Ubiquinone, and Zinc Dibutyldithiocarbamate.

[0032] Some examples of antiperspirant agents and deodorant agents are Aluminum Chloride, Aluminum Zirconium Tetrachlorohydrex GLY, Dichloro-m-Xylenol, Aluminum 25 Chlorohydrate, Aluminum Zirconium Tetrachlorohydrex PEG, Aluminum Chlorohydrex, Aluminum Zirconium Tetrachlorohydrex PG, Aluminum Chlorohydrex PEG, Aluminum Zirconium Trichlorohydrate, Domiphen Bromide, Aluminum Chlorohydrex PG, Aluminum Zirconium Trichlorohydrex GLY, Hexachlorophene, Aluminum Dichlorohydrate, Ammonium Phenolsulfonate, Ketoglutaric Acid, Aluminum Dichlorohydrex PEG, 30 Benzalkonium Bromide, Lauryl Isoquinolinium Bromide, Aluminum Dichlorohydrex PG, Benzalkonium Cetyl Phosphate, Laurylpyridinium Chloride, Aluminum Lactate, Benzalkonium Chloride, Methylbenzethonium Chloride, Aluminum Phenolsulfonate, Benzalkonium Saccharinate, Phenol, Aluminum Sesquichlorohydrate, Benzethonium Chloride, Sodium Bicarbonate, Aluminum Sesquichlorohydrex PEG, Bromochlorophene,

Sodium Phenolsulfonate, Aluminum Sesquichlorohydrex PG, Cetylpyridinium Chloride, Tricloban, Aluminum Sulfate, Chlorophyllin-Copper Complex, Triclosan, Aluminum Zirconium Octachlorohydrate, Chlorothymol, Zeolite, Aluminum Zirconium Octachlorohydrex GLY, Zinc Lactate, Aluminum Zirconium Pentachlorohydrate,

5 Cloflucarban, Zinc Phenolsulfonate, Aluminum Zirconium Pentachlorohydrex GLY, Dequalinium Chloride, Zinc Ricinoleate, Aluminum Zirconium Tetrachlorohydrate, and Dichlorophene.

[0033] Some examples of cosmetic biocides are Aluminum Phenolsulfonate, Ammonium Phenolsulfonate, Bakuchiol, Benzalkonium Bromide, Benzalkonium Cetyl Phosphate,

10 Benzalkonium Chloride, Benzalkonium Saccharinate, Benzethonium Chloride, Potassium Phenoxyde, Benzoxiquine, Benzoxonium Chloride, Bispyrithione, Boric Acid, Bromochlorophene, Camphor Benzalkonium Methosulfate, Captan, Cetalkonium Chloride, Cetearalkonium Bromide, Cetethyldimonium Bromide, Cetrimonium Bromide, Cetrimonium Chloride, Cetrimonium Methosulfate, Cetrimonium Saccharinate, Cetrimonium Tosylate,

15 Cetylpyridinium Chloride, Chloramine T, Chlorhexidine, Chlorhexidine Diacetate, Chlorhexidine Digluconate, Chlorhexidine Dihydrochloride, p-Chloro-m-Cresol, Chlorophene, p-Chlorophenol, Chlorothymol, Chloroxylenol, Chlorphenesin, Ciclopirox Olamine, Climbazole, Cloflucarban, Clotrimazole, Coal Tar, Colloidal Sulfur, o-Cymen-5-ol, Dequalinium Acetate, Dequalinium Chloride, Dibromopropamidine Diisethionate,

20 Dichlorobenzyl Alcohol, Dichlorophene, Dichlorophenyl Imidazoldioxolan, Dichloro-m-Xlenol, Diiodomethyltolylsulfone, Dimethylol Ethylene Thiourea, Diphenylmethyl Piperazinylbenzimidazole, Domiphen Bromide, 7-Ethylbicyclooxazolidine, Fluorosalan, Formaldehyde, Glutaral, Hexachlorophene, Hexamidine, Hexamidine Diisethionate, Hexamidine Diparaben, Hexamidine Paraben, Hexetidine, Hydrogen Peroxide,

25 Hydroxymethyl Dioxoazabicyclooctane, Ichthammol, Isopropyl Cresol, Lapyrium Chloride, Lauralkonium Bromide, Lauralkonium Chloride, Laurtrimonium Bromide, Laurtrimonium Chloride, Laurtrimonium Trichlorophenoxyde, Lauryl Isoquinolinium Bromide, Lauryl Isoquinolinium Saccharinate, Laurylpypyridinium Chloride, Mercuric Oxide, Methenamine, Methenammonium Chloride, Methylbenzethonium Chloride, Myristalkonium Chloride,

30 Myristalkonium Saccharinate, Myrtrimonium Bromide, Nonoxynol-9 Iodine, Nonoxynol-12 Iodine, Olealkonium Chloride, Oxyquinoline, Oxyquinoline Benzoate, Oxyquinoline Sulfate, PEG-2 Coco-Benzonium Chloride, PEG-10 Coco-Benzonium Chloride, PEG-6 Undecylenate, PEG-8 Undecylenate, Phenol, o-Phenylphenol, Phenyl Salicylate, Piroctone Olamine, Sulfosuccinylundecylenate, Potassium o-Phenylphenate, Potassium Salicylate,

Potassium Troclosene, Propionic Acid, PVP-Iodine, Quaternium-8, Quaternium-14, Quaternium-24, Sodium Phenolsulfonate, Sodium Phenoxide, Sodium o-Phenylphenate, Sodium Shale Oil Sulfonate, Sodium Usnate, Thiabendazole, 2,2'-Thiobis(4-Chlorophenol), Thiram, Triacetin, Triclocarban, Triclosan, Trioctyldodecyl Borate,

5 Undecylenamidopropylamine Oxide, Undecyleneth-6, Undecylenic Acid, Zinc Acetate, Zinc Aspartate, Zinc Borate, Zinc Chloride, Zinc Citrate, Zinc Cysteinate, Zinc Dibutylthiocarbamate, Zinc Gluconate, Zinc Glutamate, Zinc Lactate, Zinc Phenolsulfonate, Zinc Pyrithione, Zinc Sulfate, and Zinc Undecylenate.

[0034] Some examples of external analgesics are Benzyl Alcohol, Capsicum Oleoresin (Capsicum Frutescens Oleoresin), Methyl Salicylate, Camphor, Phenol, Capsaicin, Juniper Tar (Juniperus Oxycedrus Tar), Phenolate Sodium (Sodium Phenoxide), Capsicum (Capsicum Frutescens), Menthol, Resorcinol, Methyl Nicotinate, and Turpentine Oil (Turpentine).

[0035] Some examples of oral care agents are Aluminum Fluoride, Dicalcium Phosphate Dihydrate, Sodium Bicarbonate, Ammonium Fluoride, Domiphen Bromide, Sodium Chloride, Ammonium Fluorosilicate, Ferric Glycerophosphate, Sodium Fluoride, Ammonium Monofluorophosphate, Glycerin, Sodium Fluorosilicate, Ammonium Phosphate, Hexetidine, Sodium Glycerophosphate, Calcium Carbonate, Hydrated Silica, Sodium Metaphosphate, Calcium Fluoride, Hydrogenated Starch Hydrolysate, Sodium Monofluorophosphate, 15 Calcium Glycerophosphate, Hydrogen Peroxide, Sodium Phytate, Calcium Monofluorophosphate, Hydroxyapatite, Sodium Styrene/Acrylates/Divinylbenzene, Calcium Phosphate, Magnesium Fluoride, Calcium Pyrophosphate, Magnesium Fluorosilicate, Stannous Fluoride, Cetylamine Hydrofluoride, Magnesium Glycerophosphate, Stannous Pyrophosphate, Cetylpyridinium Chloride, Manganese Glycerophosphate, Strontium Acetate, 20 Chlorohexidine, Olaflur, Strontium Chloride, Chlorohexidine Diacetate, Phytic Acid, Tetrapotassium Pyrophosphate, Chlorohexidine Digluconate, Polyethylene, Tetrasodium Pyrophosphate, Chlorohexidine Dihydrochloride, Potassium Fluoride, Tricalcium Phosphate, Chlorothymol, Potassium Fluorosilicate, Zinc Chloride, Dequalinium Chloride, Potassium Glycerophosphate, Zinc Citrate, Diammonium Phosphate, Potassium Monofluorophosphate, 25 Zinc Sulfate, and Dicalcium Phosphate.

[0036] Some examples of oral care drugs are Ammonium Alum, Potassium Alum, Benzyl Alcohol, Carbamide Peroxide, Elm Bark Extract, Gelatin, Glycerin, Hydrogen Peroxide, Menthol, Pectin, Phenol, Sodium Bicarbonate, Sodium Perborate, and Zinc Chloride.

[0037] Some examples of oxidizing agents are Ammonium Persulfate, Calcium Peroxide, Hydrogen Peroxide, Magnesium Peroxide, Melamine Peroxide, Potassium Bromate, Potassium Caroate, Potassium Chlorate, Potassium Persulfate, Sodium Bromate, Sodium Carbonate Peroxide, Sodium Chlorate, Sodium Iodate, Sodium Perborate, Sodium Persulfate,

5 Strontium Dioxide, Strontium Peroxide, Urea Peroxide, and Zinc Peroxide.

[0038] Some examples of reducing agents are Ammonium Bisulfite, Ammonium Sulfite, Ammonium Thioglycolate, Ammonium Thiolactate, Cysteamine HCl, Cystein, Cysteine HCl, Ethanolamine Thioglycolate, Glutathione, Glyceryl Thioglycolate, Glyceryl Thiopropionate, Hydroquinone, p-Hydroxyanisole, Isooctyl Thioglycolate, Magnesium Thioglycolate,

10 Mercaptopropionic Acid, Potassium Metabisulfite, Potassium Sulfite, Potassium Thioglycolate, Sodium Bisulfite, Sodium Hydrosulfite, Sodium Hydroxymethane Sulfonate, Sodium Metabisulfite, Sodium Sulfite, Sodium Thioglycolate, Strontium Thioglycolate, Superoxide Dismutase, Thioglycerin, Thioglycolic Acid, Thiolactic Acid, Thiosalicylic Acid, and Zinc Formaldehyde Sulfoxylate.

15 [0039] An example of a skin bleaching agent is Hydroquinone.

[0040] Some examples of skin protectants are Allantoin, Aluminum Acetate, Aluminum Hydroxide, Aluminum Sulfate, Calamine, Cocoa Butter, Cod Liver Oil, Colloidal Oatmeal, Dimethicone, Glycerin, Kaolin, Lanolin, Mineral Oil, Petrolatum, Shark Liver Oil, Sodium Bicarbonate, Talc, Witch Hazel, Zinc Acetate, Zinc Carbonate, and Zinc Oxide.

20 [0041] Some examples of sunscreen agents are Aminobenzoic Acid, Cinoxate, Diethanolamine Methoxycinnamate, Digalloyl Trioleate, Dioxybenzone, Ethyl 4-[bis(Hydroxypropyl)] Aminobenzoate, Glyceryl Aminobenzoate, Homosalate, Lawsone with Dihydroxyacetone, Menthyl Anthranilate, Octocrylene, Octyl Methoxycinnamate, Octyl Salicylate, Oxybenzone, Padimate O, Phenylbenzimidazole Sulfonic Acid, Red Petrolatum,

25 Sulisobenzene, Titanium Dioxide, and Trolamine Salicylate.

[0042] Some examples of UV light absorbing agents are Acetaminosalol, Allatoin PABA, Benzalphthalide, Benzophenone, Benzophenone 1-12, 3-Benzylidene Camphor, BenzylideneCamphor Hydrolyzed Collagen Sulfonamide, Benzylidene Camphor Sulfonic Acid, Benzyl Salicylate, Bornelone, Bumetriazole, Butyl Methoxydibenzoylmethane, Butyl PABA, Ceria/Silica, Ceria/Silica Talc, Cinoxate, DEA-Methoxycinnamate, Dibenzoxazol Naphthalene, Di-t-Butyl Hydroxybenzylidene Camphor, Digalloyl Trioleate, Diisopropyl Methyl Cinnamate, Dimethyl PABA Ethyl Cetearylmonium Tosylate, Dioctyl Butamido Triazone, Diphenyl Carbomethoxy Acetoxy Naphthopyran, Disodium Bisethylphenyl Tiamminotriazine Stilbenedisulfonate, Disodium Distyrylbiphenyl Triaminotriazine

Stilbenedisulfonate, Disodium Distyrylbiphenyl Disulfonate, Drometrizole, Drometrizole  
Trisiloxane, Ethyl Dihydroxypropyl PABA, Ethyl Diisopropylcinnamate, Ethyl  
Methoxycinnamate, Ethyl PABA, Ethyl Urocanate, Etrocrylene Ferulic Acid, Glyceryl  
Octanoate Dimethoxycinnamate, Glyceryl PABA, Glycol Salicylate, Homosalate, Isoamyl p-  
5 Methoxycinnamate, Isopropylbenzyl Salicylate, Isopropyl Dibenzolylmethane, Isopropyl  
Methoxycinnamate, Menthyl Anthranilate, Menthyl Salicylate,  
4-Methylbenzylidene, Camphor, Octocrylene, Octrizole, Octyl Dimethyl PABA, Octyl  
Methoxycinnamate, Octyl Salicylate, Octyl Triazone, PABA, PEG-25 PABA, Pentyl  
Dimethyl PABA, Phenylbenzimidazole Sulfonic Acid, Polyacrylamidomethyl Benzylidene  
10 Camphor, Potassium Methoxycinnamate, Potassium Phenylbenzimidazole Sulfonate, Red  
Petrolatum, Sodium Phenylbenzimidazole Sulfonate, Sodium Urocanate, TEA-  
Phenylbenzimidazole Sulfonate, TEA-Salicylate, Terephthalylidene Dicamphor Sulfonic  
Acid, Titanium Dioxide, TriPABA Panthenol, Urocanic Acid, and  
VA/Crotonates/Methacryloxybenzophenone-1 Copolymer.

15 [0043] Compositions according to the invention can be formed by combining such  
components in the following ranges expressed as weight percent, i.e., (i) 0.1-99.9 percent of  
the hydrocarbyl functional organopolysiloxane fluid or the hydrocarbyl functional  
organopolysiloxane resin; (ii) 0.1 to 99.9 percent of the cosmetic ingredient, household care  
ingredient, or health care ingredient; optionally (iii) 0.1-40 percent of a cosmetic active,  
20 household care active, or health care active; and (iv) the balance to 100 percent being water,  
an organic solvent, a silicone solvent, or one or more optional ingredients, depending upon  
the particular type of composition being prepared, and its intended end use or application.  
Generally, such compositions can generally be prepared at room temperature, using simple  
propeller mixers, Brookfield counter-rotating mixers, or homogenizing mixers. No special  
25 equipment or processing conditions are typically required.

## EXAMPLES

5 [0044] The following examples are presented to further illustrate the compositions and methods of this invention, but are not to be construed as limiting the invention. All parts and percentages in the examples are on a weight basis and all measurements were obtained at about 23°C, unless indicated to the contrary.

10 [0045] In the representative examples that follow, the ingredient listed as "Carbinol fluid" is Dow Corning® 5562 Carbinol fluid (Dow Corning Corporation, Midland MI), a hydrocarbyl functional organopolysiloxane having the formula,

$R^1Me_2SiO(Me_2SiO)_xSiMe_2R^1$  where  $R^1$  is  $-(CH_2)_3OCH_2CH_2OH$ , and  $x$  is such to provide the product with a viscosity of about 50 cS (mm<sup>2</sup>/s) at 23°C.

### *Example 1 - ANTIPERSPIRANT STICK*

15 [0046] An antiperspirant stick was made by simultaneously mixing the following amounts of the following ingredients using a propeller blade at 1200 rpm. The mixture was heated to 80 °C until fully melted, then cooled to 60 °C with stirring, and poured into AP stick containers.

	<u>Ingredient</u>	<u>Weight Percent</u>
20	Decamethylcyclopentasiloxane (D5)	38
	Carbinol Fluid	15
	Aluminum Zirconium	
	Tetrachlorohydrex-Gly	25
	(AZG-370, Summit Research Labs,	
25	Flemington, New Jersey)	
	Hydrogenated Castor Oil	5
	Talc	1
	Stearyl Alcohol	16

*Example 2 - COSMETIC FOUNDATION*

[0047] A pigment premix was made by mixing the following amounts of the following ingredients:

	<u>Pigment Premix</u>	<u>Weight Percent</u>
5	D5	50.0
	Caprylyl Silane treated Titanium Dioxide	13.2
	Caprylyl Silane treated Red Iron Oxide	11.4
	Caprylyl Silane treated Yellow Iron Oxide	18.3
10	Caprylyl Silane treated Black Iron Oxide	7.1

[0048] Phase A was then made by mixing the following amounts of the following ingredients at 400 rpm using a dual blade emulsion mixing setup. D5 in the silicone polyether used in Phase A is decamethylcyclopentasiloxane.

	<u>Phase A</u>	<u>Weight Percent</u>
15	Pigment Premix	28.5
	Silicone Polyether in D5	7.5
	Carbinol Fluid	8.0

20 [0049] Phase B was then made by mixing the following amounts of the following ingredients with a magnetic stir bar.

	<u>Phase B</u>	<u>Weight Percent</u>
25	Water	54.8
	Sodium Chloride	1.0
	Polyoxyethylene (20) Sorbitan	
	Monolaurate (Tween 20)	0.2

30 [0050] Phase B was then slowly added to phase A using an addition funnel. The mixture was then mixed an additional 10 minutes at 1376 rpm.

*Example 3 - FABRIC SOFTENER*

[0051] A fabric softener was made by simultaneously mixing the following amounts of the following ingredients using a magnetic stir bar until thoroughly blended.

<u>Ingredient</u>	<u>Weight Percent</u>
5 Tetranyl L1/90	17.8
Magnesium Chloride	0.1
Preservative (Formol)	0.1
Carbinol Fluid	2.0
Water	80.0

10 [0052] Tetranyl L1/90 is Dihydrogenated Tallowylethyl Hydroxyethylmonium Methosulfate, a surfactant fabric softener manufactured by Kao Corporation.

*Example 4 - HAIR GEL*

[0053] A hair gel was made by the following process. The ingredients in Phase A were mixed together at 500 RPM, using a dual blade set up. The mixing speed was increased to 800 RPM and Phase B was added incrementally to Phase A, and then stirred until uniform. Phase C was added. The mixing speed was increased to 1376 RPM and continued for an additional 10 minutes.

<u>Phase A</u>	<u>Weight Percent</u>
20 Polyacrylamide (and) Isoparaffin (and) Laureth-7 (Sepigel 305, Seppic, Paris, France)	1.5
Silicone Polyether in D5	2.0
25 Glycerin	40.0

<u>Phase B</u>	<u>Weight Percent</u>
Deionized water	46.5

<u>Phase C</u>	<u>Weight Percent</u>
Carbinol Fluid	5.0
D5	5.0

### *Example 5 - ANHYDROUS ROLL-ON ANTIPERSPIRANT*

[0054] An anhydrous roll-on antiperspirant was made by the following process. The ingredients in Phase A were mixed together at 800 RPM until homogeneous. Phase B was then slowly added to Phase A, and then mixed for an additional 15 minutes.

	<u>Phase A</u>	<u>Weight Percent</u>
5	D5	70.0
	Carbinol Fluid	5.0
10	Cyclomethicone (and) Quaternium 18 Hectorite (and) SDA 40 (Bentone Gel VS-5, Rheox Inc., Highstown, New Jersey)	3.0
	200 Proof Ethanol	2.0

### Example 6 - HAIR CONDITIONER

20 [0055] A hair conditioner was made by the following process. The water in Phase A was heated to about 5 °C and then the hydroxyethyl cellulose and cetrimonium chloride was added.

[0056] The mixture was mixed until uniform. The ingredients of phase B were mixed together and heated to 60-70 °C using a water bath. Phase C was heated to 80 °C and added to phase B while stirring at 800 RPM. The mixture was stirred for an additional 10 minutes then added to Phase A with gentle mixing and continued until uniform. The mixture was then cooled to room temperature with gentle mixing, then Phase D was added and mixed for an additional 10 minutes.

<u>Phase A</u>	<u>Weight Percent</u>
30	
Deionized Water	50.0
Hydroxyethyl Cellulose	1.5

(Natrosol 250 HHR, Hercules Inc.,  
Wilmington, Delaware)

Cetrimonium Chloride 0.3

5 (Arquad 16-29, Akzo Nobel Chemicals, Inc.,  
Chicago, Illinois)

Phase B Weight Percent

Cetearyl Alcohol 1.0

10 Glyceryl stearate (and) PEG 100 stearate 1.0  
(Arlacel 165, Uniqema (ICI Surfactants),  
Wilmington, Delaware)

15 Carbinol Fluid 2.0

Phase C Weight Percent

Deionized Water 44.2

20 Phase D Weight Percent

Preservative, DMDM Hydantoin  
(Glydant, Lonza Inc., Fair Lawn, New Jersey) 0.2

25 *Example 7 - WATER-IN-OIL MOISTURIZER*

[0057] A water-in-oil moisturizer was made using the following procedure. Phase A was mixed at 300 RPM and heated to 40 °C to solubilize the petrolatum and lanolin. Phase B was made by dissolving the sodium chloride in the water and then adding glycerin and mixing until uniform. Using an addition funnel, Phase B was slowly added to Phase A while mixing at 1376 RPM. After the addition was complete, preservative was added and mixing continued for 10 minutes. The resultant cream was passed through a Gifford-Wood homogenizer for 3 minutes.

Phase A Weight Percent

10	Crosslinked Silicone Polyether (Laurylmethicone Copolyol)	2.0
5	Mineral Oil	10.0
	Petrolatum	2.0
	Lanolin	1.0
10	Isopropyl Myristate, (Emerest 2314, Henkel Corp./Emery Group, Ambler, Pennsylvania)	2.0
	Carbinol Fluid	1.0
15	D5	5.0

Phase B Weight Percent

20	Glycerin	5.0
	Sodium Chloride	2.0
	Deionized Water	69.8
25	Preservative, Diazolidinyl urea & parabens, Germaben II, International Specialty Product/ISP, Wayne, New Jersey)	0.2

[0058] Compositions prepared according to the invention can be used in various over-the-counter (OTC) personal care compositions, health care compositions, and household care compositions, but especially in the personal care arena. Thus, they can be used in 30 antiperspirants, deodorants, skin creams, skin care lotions, moisturizers, facial treatments such as acne or wrinkle removers, personal and facial cleansers, bath oils, perfumes, colognes, sachets, sunscreens, pre-shave and after-shave lotions, liquid soaps, shaving soaps, shaving lathers, hair shampoos, hair conditioners, hair sprays, mousses, permanents, depilatories, hair cuticle coats, make-ups, color cosmetics, foundations, blushes, lipsticks, lip

balms, eyeliners, mascaras, oil removers, color cosmetic removers, nail polishes, and powders.

[0059] Other variations may be made in compounds, compositions, and methods described herein without departing from the essential features of the invention. The embodiments of the 5 invention specifically illustrated herein are exemplary only and not intended as limitations on their scope except as defined in the appended claims.